

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Clean Coal Power
Initiative (CCPI)

05/2005



DEMONSTRATION OF A 285-MW COAL-BASED TRANSPORT GASIFIER

Project Description

CONTACTS

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PARTICIPANT

Southern Company Services
Birmingham, AL

LOCATION

Stanton Energy Center
Orlando, FL

Southern Company Services, Inc. of Birmingham, Alabama plans to develop an air-blown Integrated Gasification Combined Cycle (IGCC) power plant demonstration project utilizing a coal-based transport gasifier. This demonstration highlights a technology - the transport reactor - that has been used successfully for over 50 years in the petroleum refining industry. The transport gasifier has a fuel-flexible design projected to have higher efficiency and lower capital and operating costs than the currently available oxygen-blown entrained-flow gasifiers. The Demonstration Plant, co-owned by Orlando Utilities Commission and Southern Power Company, will be built in Orange County, Florida and generate 285 MW (net) of electricity using sub-bituminous coal.

This project was one of two selected in Round 2 of the Clean Coal Power Initiative to demonstrate advanced power generation systems using Integrated Gasification Combined Cycle technology. In a combined cycle plant two power generators, or cycles, are used in combination to generate electricity in a very efficient manner. Coal is first heated in a specialized process vessel with air and steam to drive off the gas from the coal. The gas from the coal is first consumed in a gas turbine to generate electricity. The hot exhaust gas leaving the turbine is then used to heat water to produce steam to power a steam turbine and generate additional electricity. Using the gas in two different cycles increases the amount of electricity that can be generated from a ton of coal and does so in an environmentally friendly manner.

The coal gas in some IGCC plants is produced by using oxygen. Oxygen is expensive and its generation on-site requires significant electricity, thus reducing the amount available for sale. Southern Company's air-blown plant will use the oxygen in the air to produce coal gas, thereby increasing the efficiency of the plant. The air-blown transport gasifier can process low-rank coals and has higher efficiency and lower capital and operating costs than the currently available oxygen-blown commercial gasifiers. It will gasify sub-bituminous coal and operate at a heat rate of 8,400 Btu/kWh (40.6 percent efficiency).



TOTAL ESTIMATED COST

\$557,056,000

COST SHARE

DOE \$235,000,000

Participant \$322,056,000

ADDITIONAL TEAM MEMBERS

Southern Power Company

Birmingham, AL

(Co-owner)

Orlando Utilities Commission

Orlando, FL

(Co-owner)

KBR

Houston, TX

ESTIMATED PROJECT DURATION

114 months

ADDRESS

National Energy Technology Laboratory

3610 Collins Ferry Road

P.O. Box 880

Morgantown, WV 26507-0880

CUSTOMER SERVICE

1-800-553-7681

WEBSITE:

www.netl.doe.gov

Benefits

The transport gasifier offers a simpler and more robust method for generating power from coal than other alternatives. It is unique among coal gasification technologies in that it is cost-effective when handling low rank coals and when using coals with high moisture or high ash content. These coals make up half the proven reserves in both the U. S. and the world. Moreover, the transport gasifier is capable of both air- and oxygen-blown operation. This inherent flexibility will allow it to readily adapt to other applications beyond power generation such as the production of chemicals.

IGCC Transport Gasifier Flow Diagram

This gasifier will also readily adapt to possible future greenhouse gas management requirements that may result from the Global Climate Change Initiative (GCCI). The GCCI's goal is the significant reduction of greenhouse gas intensity of the United States Economy over the next 10 years. Analysis shows that the economic benefits offered by the air-blown transport gasifier relative to other IGCC systems, including those that are oxygen-blown, are preserved even when CO₂ capture and sequestration is incorporated into the design. The transport gasifier is further projected to achieve high environmental standards for SO₂, NO_x, dust emissions, and mercury. Means of reducing water consumption are incorporated in the design and possible gasifier ash utilization applications have been identified

